

Power plant emissions verified remotely at Four Corners sites

May 19, 2014



Space-based measurements can support Clean Air Act regulations

LOS ALAMOS, N.M., May 19, 2014—Air pollution and greenhouse gas emissions from two coal-fired power plants in the Four Corners area of northwest New Mexico, the largest point source of pollution in America, were measured remotely by a Los Alamos National Laboratory team. Led by Laboratory senior scientist Manvendra Dubey, the study is the first to show that space-based techniques can successfully verify international regulations on fossil energy emissions. Furthermore, the study was able to distinguish that emissions from the nearby San Juan Generating Station are actually less polluting than those from the nearby Four Corners Generating Station.

“A critical barrier to any future international treaty aimed towards controlling greenhouse and pollutant gas emissions is our inability to verify inventories and reduction of emissions claimed by individual nations following implementation of new technologies” Dubey noted.

He stressed that “in-stack monitoring of power-plant emissions is mandatory in the United States, and they are reported to the EPA to comply with the US Clean Air Act, allowing us to test how well our verification method worked.”

To verify emissions from the San Juan and Four Corners coal-fired power plants, the Los Alamos team deployed ground-based solar spectrometers and point sensors to measure atmospheric concentrations of gases at a site close to these power plants. Now that we have demonstrated the scientific feasibility of verification, we can use this to ensure that energy technology upgrades emissions reported by China and India are accurate, Dubey said.

“Using satellite-based remote-sensing equipment can allow scientists, and therefore policymakers, to determine with accuracy whether carbon dioxide (CO₂), carbon monoxide, and nitrogen oxides detected in the vicinity are truly from the plant, or from other sources,” said Rodica Lindenmaier, postdoctoral research associate and first author of the paper.

The team concludes in the paper that the “high frequency and precision ground-based remote sensing results provide the performance metric and sampling strategy for satellite-based measurements, permitting a global emission monitoring system.”

The authors also monitored the isotopic ¹³C composition of CO₂, which serves as a fingerprint of emissions from coal-fired power plants and matched it to that of the local coal. The author’s remote observations also show that 75 percent of the atmosphere (~10 km) in the region containing these two power plants is polluted. The research was supported by Los Alamos’ Laboratory Directed Research and Development funding program.

Journal link: Proceedings of the National Academy of Sciences article 13-21883:

[“Multi-scale observations of CO₂, ¹³CO₂ and pollutants at Four Corners for emission verification and attribution,”](#) by Rodica Lindenmaier et al. Photo caption for image below: Measurement devices in place near the Four Corners coal-fired power plant, allowing Los Alamos National Laboratory researchers to analyze emissions.

Los Alamos National Laboratory

www.lanl.gov

(505) 667-7000

Los Alamos, NM

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